

## 1                   S P E C I F I C A T I O N

## 2                   BICYCLE CARRIER FOR MOTOR VEHICLES

## 3                   BACKGROUND OF THE INVENTION

4                 The field of the invention is bicycle racks and the  
5                 invention relates more particularly to bicycle racks which are  
6                 affixable to motor vehicles or to trailers of motor vehicles. A  
7                 myriad of styles of bicycle racks are commercially available  
8                 since it is very common for a motorist to desire to transport a  
9                 bicycle to a location where the bicycle can be ridden. A search  
10                revealed one patent which utilized a bicycle seat receptacle as a  
11                portion of a rack for supporting a bicycle. This is U.S. Patent  
12                No. 4,219,142. This rack does not tighten a bicycle against a  
13                rod, but uses the rod together with a tie-down to hold the seat  
14                receptacle on one portion of the rack and a receptacle also with  
15                a tie-down to hold the goose neck portion of the bicycle to the  
16                rack.

17                Many racks require lifting the bicycle onto the roof of the  
18                motor vehicle. Other racks support only a single bicycle. Many  
19                racks require numerous fasteners to hold the bicycle onto the  
20                rack, and are thus time consuming to mount the bicycle onto the  
21                rack and to remove it from the rack.

**1 BRIEF SUMMARY OF THE INVENTION**

2       The present invention is for a bicycle carrier for  
3 supporting a bicycle to a motor vehicle. A bicycle supporting  
4 rod having a conical and/or cylindrical portions is held to the  
5 vehicle. These portions may be tapered as in a conical version  
6 or stepped as in a cylindrical version. The present invention is  
7 also for the process of placing a bicycle onto the carrier. The  
8 process includes a step of removing the seat from the bicycle.  
9 The seat receptacle is then placed over the rod of the carrier  
10 and tightened against the rod to securely hold the bicycle to the  
11 rack.

**12 BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING**

13       Figure 1 is a perspective view showing the bicycle carrier  
14 of the present invention supporting a bicycle shown in phantom  
15 view.

16       Figure 2 is an exploded perspective view of the bicycle  
17 carrier of the present invention.

18       Figure 3 is a perspective view of a bracket which forms a  
19 portion of the carrier of Figure 1.

20       Figure 4 is a perspective view of a vertical structural  
21 member and a horizontal structural member of the bicycle carrier  
22 of Figure 1.

23       Figure 5 is an exploded perspective view of a square bent U-  
24 bolt which forms a portion of the carrier of Figure 1.

1           Figure 6 is an exploded perspective view of a conical rod  
2           and hollowed bracket of the bicycle carrier of Figure 1.

3           Figure 7 is an exploded perspective view of anti-wobble  
4        clamp bolt assembly which forms a portion of the carrier of  
5        Figure 1.

6                  Figure 8 is a perspective view of an alternate embodiment of  
7                  the bicycle carrier of Figure 1.

8               Figure 9 is a perspective view of an alternate embodiment of  
9               the bicycle carrier of Figure 1.

10 Figure 10 is a perspective view of an alternate embodiment  
11 of the bicycle carrier of the present invention.

## **DETAILED DESCRIPTION OF THE INVENTION**

13           The bicycle carrier of the present invention is shown in  
14 perspective view in Figure 1 and indicated generally by reference  
15 character 10. Carrier 10 is supported with respect to a motor  
16 vehicle (not shown) by a tow hitch receptacle 11 which holds a  
17 horizontal length of square tubing 12 by a conventional tow hitch  
18 pin 13.

19 It has been beneficial, although not essential, that square  
20 tube 12 be supported in tow hitch receptacle 11 in a manner that  
21 prevents it from wobbling. This can be accomplished by use of an  
22 anti-wobble clamp assembly 14 shown in Figure 7 of the drawings.  
23 This utilizes a square eye bolt 15 which is tightenable against  
24 square tube 12 and tow hitch receptacle 11 by an anti-wobble

1 clamp bracket 16. A threaded nut 17 is screwed onto a threaded  
2 portion 18 of square eye bolt 15.

3 A generally vertical structural member 19 is held to square  
4 tube 12. Although not essential, it is beneficial that  
5 structural member 19 be removable from square tube 12 for storage  
6 and transportation of carrier 10. This can be accomplished by a  
7 hinged arrangement which utilizes a bent plate hinge 20 shown  
8 best in Figure 4, which passes over a hinge pin 21 shown best in  
9 Figure 3. Once the bent plate hinge 20 has been placed over  
10 hinge pin 21, the structural member 19 is moved into a vertical  
11 position as shown in Figure 2. It is then clamped against a prop  
12 and clamped thereto by square bent u-bolt 23. U-bolt 23  
13 passes through a mounting plate 24 and is secured by two knobs 25  
14 with threaded holes shown in Figure 5. One benefit of the hinge  
15 assembly shown in Figure 1 is that the vertical structural member  
16 19 can be easily hinged downwardly to facilitate the opening of a  
17 back door of a vehicle. There are, of course, numerous other  
18 ways of supporting generally vertical structure member 19 to the  
19 tow hitch receptacle or to square tube 12. For instance, it  
20 maybe simply welded, as shown in Figure 8 and Figure 9.

21 As shown in Figures 1 and 2, a horizontal structural member  
22 26 is welded or otherwise affixed to vertical member 19 for  
23 supporting bicycle carrying brackets 27. A particular design of  
24 a bicycle carrying bracket 27 is shown in exploded perspective  
25 view in Figure 6. There it can be seen that a hollow bracket 28

1 has a square opening 29 which fits over structural member 26. A  
2 tightening knob 30 has a threaded portion which screws into a  
3 threaded hole 31.

4       A bicycle carrying bar 32 is welded or otherwise affixed to  
5 hollow bracket 28. Bar 32 has a cylindrical portion 33 and a  
6 conical portion 34. Conical portion 34 has a widened end 35 and  
7 a narrowed end 36. Conical portion 34 is shown as a frusto  
8 conical portion having an angle at its conical apex indicated by  
9 the reference letter "a." As shown in Figure 1, a bicycle 37 has  
10 a bicycle seat receptacle 38 which has been placed over conical  
11 portion 34 of bicycle carrying bar 32. A short cylindrical set  
12 length 39 extends outwardly from narrowed end 36. This assists  
13 in guiding a bicycle seat receptacle onto the bicycle carrying  
14 bracket 27. A bicycle seat has been removed from bicycle 37  
15 which leaves an open receptacle with a tightening knob 41 which  
16 is a part of bicycle 37. In some bicycles, a nut or other  
17 tightening device may be used. This is the portion of the  
18 bicycle which tightens the seat at the appropriate height and is  
19 invariably equipped to be loosened so that the seat height can be  
20 changed and tightened against the shaft of the seat assembly.  
21 The bicycle is actually held by gravity and the tightening step  
22 prevents movement and rattling, but is not essential for holding  
23 the bicycle on the rod. While frusto conical lengths have been  
24 emphasized above, the bicycle seat receptacle contacting portion  
25 may be of a stepped configuration as shown in Figure 10. Rod 51

1 has a series of cylindrical steps 42, 43, 44, 45, 46, 47, 48, 49,  
2 and 50. The seat receptacle is pushed along rod 51 until it  
3 surrounds the largest step over which it will fit. The knob 41  
4 is then tightened to secure the bicycle.

5 Once one reaches a destination and wishes to remove the  
6 bicycle, the knob 41 is loosened and the bicycle may be easily  
7 pulled out of contact with the bicycle carrying bar 32. The  
8 conventional bicycle seat is then replaced in bicycle seat  
9 receptacle 38. The configuration shown in Figure 1 holds four  
10 bicycles and for many applications, it is preferred that a lesser  
11 number of bicycles be carried. A simplified bicycle carrier 40  
12 for two bicycles is shown in Figure 8. This has a square tube 12  
13 with an opening 13' for tow hitch pin 13. A generally vertical  
14 structural member 19 is welded to square tube 12. Two bicycle  
15 carrying bars 32 are welded or otherwise affixed near the top of  
16 generally vertical structural member 19. These bars, like the  
17 bars shown in Figures 1 and 2, are affixed at a slightly upward  
18 configuration from the horizontal. An angle indicated by  
19 reference letter "d" in Figure 8 indicates this upward mounting.  
20 Angle "d" should be large enough to tend to urge the bicycle onto  
21 the tapered portion 34. Angle of about 15° is preferred, since  
22 this will keep bicycles vertical (front wheel above rear wheel),  
23 thus minimizing width of bicycle vertical projection.

24 With regard to specific dimensions, it has been found that a  
25 bicycle carrying bar 32 having a tapered cone apex angle of

1       between about 2 and about 5 degrees and preferably about 3°, a  
2       small diameter of about 0.9", a large diameter of about 1.2", and  
3       a length of the tapered portion of 6" has worked satisfactorily.  
4       The bicycle carrying bar or rod may be solid or hollow and may be  
5       mounted in a horizontal plane or as described above with the  
6       conical surface pointing upwardly. The bicycle carrying bar may  
7       be cylindrical for a particular size of bicycle. A tapered bar  
8       permits a wider range of bicycles to be secured to the bar.

9           The bicycle carrier of the present invention does not  
10      require the use of straps, brackets, or hooks and loops to hold  
11      and secure a bicycle to the carrier. The invention requires only  
12      a single fastener to secure and stabilize a bicycle to the  
13      bicycle carrier. That fastener is not part of the bicycle  
14      carrier, but is part of any conventional bicycle itself. It is  
15      inexpensive to manufacture, is easily attached to a conventional  
16      trailer hitch and may be easily removed when not needed.

17           Another advantage of the bicycle rack of the present  
18      invention is that any one bicycle can be removed in any order.  
19      Many bicycle racks stack the bicycles so that the outer bicycle  
20      must be removed first. Also, stacking bicycles tends to move the  
21      center of gravity further away from the vehicle. With the  
22      present invention, the center of gravity does not move outwardly  
23      with additional bicycles.

24           The present embodiments of this invention are thus to be  
25      considered in all respects as illustrative and not restrictive;

1       the scope of the invention being indicated by the appended claims  
2       rather than by the foregoing description. All changes which come  
3       within the meaning and range of equivalency of the claims are  
4       intended to be embraced therein.